Space Weather Forecast

Issued on Wednesday, 29 November 2023 at 12:46 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: M-flares likely (R1-R2 Blackouts). G1/Minor G2/Moderate Storms likely Days 2-3 (30 Nov-01 Dec) due to coronal mass ejection arrivals.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate recently, with a Moderate (near Strong) flare at 28/1950 UTC, from a region close to centre disk in the south. This is the most notable and largest of the thirteen visible sunspot regions. There are also a number of filaments on the Earth-facing disc. The Moderate flare observed earlier has given a halo coronal mass ejection (CME), which is very likely to be Earth directed, and has been included in the accompanying forecast with an arrival time at Earth on Day 3 (01 Dec).

Solar Wind / Geomagnetic Activity: Solar wind speeds have been at slightly elevated winds speeds. Interplanetary Magnetic Field was weak, with the north-south component also varying weakly. Geomagnetic activity was Quiet (Kp1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate with isolated Moderate flares (R1-R2 Blackout) considered likely, and a slight chance of an isolated Strong flare (R3 Blackout). The plausible source region being the large and complex spot in the south, close to centre disk.

Solar Winds / Geomagnetic Activity: Four earth directed coronal mass ejections feature in the forecast. Two of which are most likely to arrive Day 2 (30 Nov), with the third and fourth arriving Day 3 (01 Dec). These coronal mass ejections may interact with one another due to their varying velocities, the later faster coronal mass ejections may enhance those which left the Sun earlier in the period. Aside from the coronal mass ejections, the current slightly elevated solar wind from ongoing coronal hole influence is expected to soon ease to background through Day 1 or early Day 2 (29-30 Nov).

Geomagnetic activity is initially expected to be Quiet (Kp1-2) with a chance of isolated Unsettled spells (Kp3). Multiple fast CME arrivals are likely to bring G1/Minor or G2/Moderate (Kp5-6) geomagnetic storms on Day 2 or 3 (30 Nov or 01 Dec) with a slight chance of G3/Strong storms (Kp7). Geomagnetic activity is then expected to wane into Day 4 (02 Dec) with Quiet to Active intervals (Kp1-4) and a slight chance of a G1/Minor storm (Kp5).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to stay at background. There is a slight chance of flux levels approaching or perhaps exceeding the S1 level later in the period as the large and complex sunspot region

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mentioned earlier moves further west on the visible disc.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	60	70	20
Strong	G3	No	1	10	20	1
Severe	G4	No	1	1	5	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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